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ABSTRACT

This document, the first in a four-part series, presents a synopsis of a Geneva research report delivered at Cornell University (New York). It describes a study in which 10-month-old infants were given intermittent free-play opportunities to manipulate 18 objects. Regularly presented in disarray were 6 balls, 6 sticks, and 6 open cubes; each set was graduated in size. Repeated viewings of videotaped behaviors revealed a consistent pattern and succession of organizing practices which were implemented spontaneously and universally over the course of 14 months. Also spontaneous and universal was the abrupt cessation of the organizing behaviors following a final, perfect, continuous review of all the organizing patterns which had previously been practiced. It is argued that the contrived setup used in the study, which regularly presented the same three sets of objects in disarray, stimulated the children's curiosity and motivated the acts of initiative which occurred. Properties of the objects and the disarray induced purposeful explorations, enhanced and sustained constructive interest, and prompted the repetitive displays of relation among the objects. It is thought that the abrupt cessation of the organizing practices marked the time when the relations were no longer held in question by the young children, but rather were known by them (i.e., internalized as schemes). The internalization accounts for the reappearance of the practiced schemes later when the children were faced with new problems. (RH)

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I. Initiative and Purpose in the Motoric Explorations of 10-
24 Month Old Children: An Educator's Interpretation of a
Geneva Study

ABSTRACT

This article presents a synopsis . a report of Geneva research (1979, Sinclair, Unpublished) which was delivered at Cornell University. The report described the onset and evolu-
tion of organizing behaviors which occurred over a fourteen
month period, from ten to twenty-four months. Bentley comments
on the data from an educator's perspective. She reasons that
the contrived setup, which regularly presented the same three
sets of objects in disarray, stimulated the children's curiosity
and motivated the acts of initiative which occurred. She suggests
that properties of the objects and the disarray induced purpose-
ful explorations, enhanced and sustained constructive interest,
and prompted the repetitive displays of relation among the
objects. She theorizes that the abrupt cessation of the organ-
izing practices marks the time when the relations were no longer
in question by the young children, but were known by them (i.e.
internalized). The internalization accounts for the reappear-
ance of the practiced schemes later on when the children were
faced with new problems. This explanation supports the researchers'
observation that the schemes were later used as procedural tools
to solve new problems.

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I Initiative and Purpose in the Motoric Explorations of 10 - 24 Month Old Children: An Educator's Interpretation of a Geneva Study

A. Introduction

In this article I present a synopsis of a report of Geneva research (1979, Sinclair, Unpublished) and my interpretation of it as an educator. The report was delivered by Dr. Hermine Sinclair of the University of Geneva to a Cornell University audience on May 7, 1979. The report described the onset and evolution of organizing behaviors which occurred over a fourteen month period, from ten to twenty-four months. Commencing at age ten months the children were given intermittent free-play opportunities to manipulate the same eighteen objects. Regularly presented in disarray were six balls, six sticks, and six open cubes; each set was graduated in size. After repeated viewings of videotaped behaviors the researchers discerned a consistent pattern and succession of organizing practices which were implemented spontaneously and universally over the course of fourteen months. Also spontaneous and universal was the abrupt cessation of the organizing behaviors following a final perfect, continuous review of all the organizing patterns which had previously been practiced and perfected.

As a veteran teacher of young children it is habitual for me to analyze child behaviors in relation to environmental stimuli, preset objectives, and the means provided or used to foster achievement of the objectives. This is the mindset

which I bring to interpretation of the Geneva report. I make a number of inferences. These pertain to what the children were doing, why they were doing it, what they accomplished, and why they accomplished it.

I reason that the contrived setup, which regularly presented the same objects in disarray, stimulated the children's curiosity and prompted the acts of initiative which occurred. Properties of the objects and the disarray induced purposeful explorations while enhancing and sustaining constructive interest and repetitive displays of relation among the objects. I theorize that the abrupt cessation of the organizing practices marks the time when the relations were no longer in question by the young children, but were known (i.e. internalized). This internalization accounts for the reappearance of the practiced schemes later when the children were faced with new problems. This explanation supports the researchers' observation that the schemes were later used as procedural tools to solve new problems.

My synopsis of the Geneva report follows.

B. The Geneva Report

1. Data Set A

Dr. Sinclair described a videotaped scene involving four children at a day care center. The children were participating in a free-play period in an area set aside for videotaping their free-play activities with materials placed there by the researchers.

Four children, 20 - 22 months old, were gathered around a table. On the table was a variety of objects which could be transformed in some way. Child #1 grabbed a fairly thick straw and a piece of spaghetti. He brought these together in such a way that the spaghetti quickly slipped through the straw and out the opposite end. He picked up the spaghetti and again inserted it in the straw and looked again very quickly. He continued this pattern of inserting and looking until he was almost upside-down studying the workings of the spaghetti and the straw.

While child #1 was doing this, child #2 was watching. He seemed to be looking around as though he wanted a straw too, but there wasn't any. He picked up a big, flat wooden ring, and put a stick through it; then he started teetering it, first one end up, and then the other, with his hands. Child #1 had also succeeded in this type of motion, i.e. teetering the straw without losing the spaghetti inside. #2 child's sliding of the ring on the stick followed #1 child's success with the spaghetti.

In the meantime child #3 was absentmindedly squeezing a

piece of play dough in her hand and watching these proceedings. At last she picked up a stick or a pencil and pierced a hole through the play dough. She placed the piercing tool back down and picked up another stick, thus creating the object she needed for an analogical kind of experimentation.

#4 child was standing up. On his arm was a length of thick string. He took it off and put it around a chair rung. Then he took it off and put it around a block. He then took the block and put it elsewhere. Picking his round thing up, he placed it carefully around the block; he took the block out carefully....

For a few minutes all four toddlers were engaged in self-initiated activities which were analogically similar. (Author's note: It seems to me that the second child performed analogous imitation when he was unable to perform direct imitation. There was only one straw and one piece of spaghetti, so direct imitation was impossible. It was necessary for the second child to reflect upon the action of the first and abstract some rudimentary notions concerning form and structure and pose some questions to himself concerning how form and structure served the process of transformation. Anyway, his reflections, whatever they were, issued in the selection of the ring and then the stick followed by an analogous experimentation.

Child #3 and child #4 apparently also were trying to imitate the procedures of child #1 and/or child #2. Child #3 created a structure analogically similar to #2's ring and proceeded to imitate his transforming action in so far as the materials allowed. I note with interest that the piercing tool was put

down and a stick chosen in direct imitation of child #2. Child #3 appears to attend to each element in the transformation one at a time. Child #4 performed analogical imitation of the form of action in #1 and #2's transformation procedures. His behavior shows a similar one-to-one correspondent attention to the elements and the form of action involved in accomplishing the transformation.)

2. Data Set B

Dr. Sinclair remarked that children, after the age of twelve months, exhibit different behaviors according to the materials presented. Children of ten or eleven months age generally display the same behaviors regardless of what materials are presented: e.g. tapping, pushing things with something, showing, handing (putting things from one hand to the other), putting objects in the mouth, putting them onto another part of the body, trying to hit two things together...

Dr. Sinclair described the introduction of particular materials which were chosen because they would lend themselves to logical organization. They were 6 small open cubes of graduated size (the smallest was approximately 1/3 inch or 1 centimeter), 6 sticks of graduated size (the longest was approximately 20 centimeters or 10 inches in length), and 6 rather hard plasticene or play dough balls (the biggest of these was approximately 2 centimeters and the smallest a little marble-like thing). Each free-play period was approximately twenty minutes long.

3. Data Set C

From twelve to fourteen or fifteen months the children spend the twenty minute period filling up one cube or two cubes with whatever they find available. When it is quite full, they often use a stick or a finger and poke in the filled cube, as though checking to see if there is any space left. The children empty the cubes; they empty them as they filled them, one item by one item. They do not dump the items. They remove them one by one. (Author's note: Is this one-by-one filling and emptying a precursor of counting? If so, then the preschool how-to-count principles described by Gelman may arise as a consequence of such experiences. Selection of a container, and subjection of objects to containment may signal the rudimentary beginnings of the abstraction principle while poking of the filled container may announce the rudimentary beginnings of the cardinal principle. (1)

It is interesting to note that the young children's concentration was on one by one action rather than on a quick accomplishment of emptiness or fullness. It is interesting to note, too, the child's interest in the constraint which the size of the container imposes on his action scheme.)

Dr. Sinclair described a child in front of a large cube which he had filled. Because the large cube was full, the little cube in his hand would not fit in. Sometimes the child poked with a finger; and sometimes he put the little cube in his mouth as though to verify to himself that the little cube

was something which could be contained, and that the large cube was a container.

Dr. Sinclair referred to this latter behavior as the "child's use of the body for verification." She stated that this using of his own body for verifying some kind of relationship recurred all the way along until the age of two. Sometimes, she said, it was used very elaborately. To illustrate this, she described a child using his hand as a type of platform and laying on the hand-platform a stick which had just fallen off repeatedly from the overturned cube on which the child had placed the stick. The child seemed to be verifying to himself that the stick could stay on a flat surface. (The base of the cube was rounded, a factor which had not been isolated by the child.)

At fourteen to fifteen months of age the children exhibited two differing kinds of behavior. One was described as an individualizing of objects; i.e. pointing to balls one at a time, or tapping different cubes with a stick. (Author's note: Do we see in this behavior the rudimentary beginnings of the one-one how-to-count principle? (2)) The other behavior was called collecting. In this case, for example, the child put a ball of plasticene in a container, looked for another ball, put it in the container, looked for another...and so forth. (Author's note: And is this behavior the beginnings of the abstraction principle? (3))

Still later all the sticks might be gathered in one hand

or all the balls into one of the cubes. The accumulating of objects was always inside a cube, not on the floor. Later, at twenty-four months, the children made exhaustive collections on the floor without need of any sort of spatial envelope to contain them. (Author's note: Does this suggest that the principles of abstraction and one-one are internalized by the age of twenty-four months?)

One-to-one correspondence developed with the placing of one stick in each cube and sometimes one ball in each cube. The cubes were not necessarily seriated; they simply saw to it that each cube had a stick, or each cube had a ball. This was followed by a simple matching which required only that each cube have one of the matching item. There was no sign of concern if cubes toppled when too long sticks were placed in them, or if balls were too big to fit in cubes. The only apparent necessity was the matching one to one.

By twenty-four months the children were also nesting cubes. Two patterns were noticed in the children's procedures. Put 5 in 6, the largest one; leave that, and then put 1, the smallest, in 2, and 3 in 4. The 3-4 fitting often presented some problem as it was apparently difficult to decide just how to accomplish the nesting task. The other pattern arrangement, used by some children, was to take 6 and put 5 and 4 in it, and then take 3 and place 2 and 1 in that. Some of the children used both nesting methods.

Dr. Sinclair described the behavior of a child who was

was having difficulty accomplishing the 3-4 nesting. The child took the 3 cube and put it in his mouth. He took it out and put it on the table. Then he put his finger in it. The child did this repeatedly. Dr. Sinclair referred to this action as the child's "use of the body for verification." She drew attention to the analogy of structure of which the child was apparently aware. The mouth is a container; the cube is a container. (Putting the cube in the mouth and the finger in the cube on the table suggests that the child may have been reflecting on this analogical similarity. Cube is to mouth as finger is to cube; or cube goes in cube as cube goes in mouth and as finger goes in cube. It is evident that the child was reflecting on the form of the action and the structure of the elements involved by which the transformation could be accomplished.)

Dr. Sinclair reported that by the age of twenty-four months all of the subjects were making the following organizations perfectly in the twenty minute free-play period:

1. One to one correspondence
2. Formation of exhaustive collections of sticks, balls, and cubes.
3. Seriated nesting of the six open cubes.

She remarked that the children ceased performing these organizing behaviors after errorless performance was achieved. Instead the children did something different with the same objects. The organizing behaviors, however, reappeared when the children were faced with a new problem to solve.

An example of this was given. The children were asked to

transport some balls of plasticene in a wire basket. The balls fell through the holes of the wire basket. The children then commenced organizing behaviors such as sorting the balls by color, e.g. putting all the red balls together, putting all the blue balls together, and so forth. Dr. Sinclair remarked that the logical organizing skills were used as procedural tools when the child faced some new problem which he did not understand.

C. An Educator's Interpretation of the Geneva Report

The Geneva research plan was an ingenious pedagogical design which prompted child-directed investigations and confirmations. The environments were perfectly equipped and staged for specific discoveries and confirmations. Free to look and to touch, the children in data sets B and C explored the scene for a couple of months. Then they commenced implementing a sequence of enumerative and organizational patterns which they practiced to perfection and internalized. The internalized schemes later served the children as procedural tools in solving new problems.

No one announced to the Geneva children the relations which were to be detected. No one commanded their confirmation. No one urged that a comprehensive demonstration of review be errorlessly conducted as a single, continuous, uninterrupted sequence of events. No one said, "Enough! You are not to subject the objects to those organizational procedures anymore." Every occurrence described was a consequence of

individual, child-directed initiative. Throughout the fourteen month period each child determined his/her own purposes and freely exercised his/her own initiative. How is the seemingly goal-directed behavior of the children to be explained?

Visual notice is a relatively passive experience. However, a child who grasps objects and touches them to his body ceases to be a passive receiver of perceptual information and becomes an actor-controller of circumstances and events. As such he becomes a creator of information over which he has partial control. The relations and transformations to which he/she subjects objects are didactical circumstances and events which mediate information to him via his perceptions. The young child who exercises control over objects and procedures and perceives the consequences of his control also detects constants and invariants which pertain to the objects he/she manipulates and the form of action he/she imposes. The behaviors of child #1 in data set A offer a clear illustration of this.

It is important to remember that on every occasion the environment presented in data sets B and C displayed scattered regularities of form, structure, and number. The overall appearance was one of chaotic disorganization. Organization which the children imposed from time to time over the fourteen month period was regularly dissolved after the children left the research environment. Thus organizations imposed by the children were impermanent, while presentation of disarray was a permanent feature of the circumstance of provision. Scattered regularities within a condition of overall disorder impacted

the perceptions of the children each time they entered the research environment. The regular dismantling (out of their sight) of organizations imposed by the children and the constant re-presentation of disarray functioned, I believe, (1) to enhance the children's constructive interest in exploring relations among the objects; and (2) to prompt and sustain purposeful interest in confirming constants and invariants in those relations.

Practicing the organizing procedures to perfection resulted in the children's internalization of the patterns and procedures as cognitive schemes. Abrupt cessation after the perfect review marks the time when internalization was assured. The universality of the errorless review-cessation behavior supports the notion that confirmation of relations among the objects was the purpose which motivated the patterned behaviors.

The sustained application of initiative in demonstrating patterns of relation is evidence that the children noticed the regularities visually, that they were interested in them, and that their purpose was to confirm them by forms of action which brought the objects into close juxtaposition. Thus hands, eyes, and form of action were brought to bear in the confirmation process. The children practiced the organizational patterns until they could accomplish every one perfectly. Each child performed a final continuous, errorless review of all the patterns within a single play period. This culminating review marks the point in time when the child-performer had satisfied his own sense of certainty concerning the perceptible regularities

which had been the focus of his/her attention over the four-teen month period. From this point on the relations were no longer held in question; therefore, imposing order on the disarray was no longer a matter of interest. Consequently, the children thereafter did other things with the same objects. The fact that the organizing patterns reappeared later and were used as procedural tools to solve new problems indicates that the abrupt cessation marks the time when the organizing patterns and procedures were internalized as schemes.

D. Summary

The presence of manipulable objects motivated the original initiative of the children. Perception of regularities in the disarray prompted the imposition of patterned arrangements. Direct imitation of the identity patterns established by the children rendered inevitable the organizations which occurred. Impermanence of the children's organizations coupled with the constant re-presentation of disarray enhanced the children's perceptual interest and induced repeated practice of the organizing procedures until the organizational patterns were internalized as schemes. The perfect culminating review marks the time when the schemes were assimilated as part of the performing child's cognitive framework.

E. References

1. Gelman, R. and Gallistel, C. R. 1978. The Child's Understanding of Number. Cambridge: Harvard University Press. p.79.
2. Ibid. p. 77.
3. Ibid. p. 80.